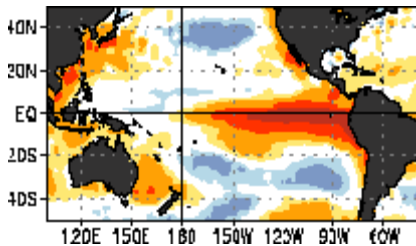




Profiling floats: Scientist holds an ocean analogue to radiosondes used in operational meteorology



Better observational systems could be used to predict and prepare for periodic climate events.

*We routinely observe the Tropical Pacific to forecast El Niño/La Niña and their influence on climate*



## FY 2003 President's Request

### Climate Change Research Initiative: Global Ocean Observing System

#### What is requested?

NOAA requests an increase of \$4 million, as part of the \$18 million increase in the Climate Observations and Services line item, to work towards the development of the Global Ocean Observing System for climate. The increase is part of the Climate Change Research Initiative announced by the President in his speech of June 11, 2001. It addresses the Administration's commitment to establish global observing systems working with other developed countries. NOAA will extend the U.S. portion of Argo floats from one third to one half of the required global array (\$3 million) and deploy moored buoys in critical locations to monitor indicators of abrupt climate change.

#### Why do we need it?

The oceans play a role in both storage and transport in the climate system. The oceans are the main 'memory' of the climate system and second only to the sun in affecting seasonal variability and long-term climate change. We need to determine whether circulation patterns are changing, as some models predict, and whether weather events such as El Niño are looming. We also need to map other regional changes of vital interest to the health of the ocean. The ocean is both a source and sink for carbon dioxide and contains 50 times more carbon than the atmosphere.

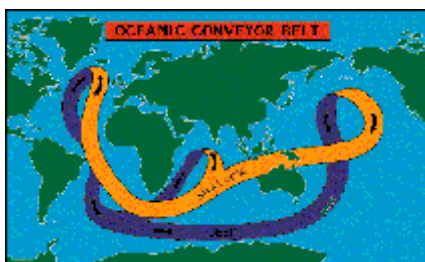
Possible changes in large-scale ocean circulation, such as a suppression of the "conveyor belt" that transports heat around the world, would greatly impact the natural climate of the U.S., the North Atlantic, and western Europe. Paleoclimate data suggest the thermohaline circulation of the North Atlantic has in the past shut off over a time period as short as several decades, resulting in significant shifts in the distribution of surface temperature, rainfall, and storms. The response of the thermohaline circulation under a changing climate is a major issue with vast potential consequences, including the possibility of abrupt climate transitions, such as those observed in the historical and geologic past. Understanding these consequences and their potential could provide crucial information to decision-makers.

Sea-level change is one of the most important consequences of climate change, and affects essentially every coastal nation. Accurate observations are needed for use in climate models, for determining the present rate of change in ocean structure, and for alerting us to any unforeseen changes in ocean circulation with potential climate impacts.

An observing system that can accurately document climate-scale changes in ocean heat, carbon, and sea level is not in place. The present ocean observing system provides only a fraction of what is needed. Some effective subsystems have recently been developed to monitor some aspects of the ocean, the most notable being the Tropical Atmosphere Ocean (TAO) array of moored buoys in the Pacific Ocean. Major issues remain in better determining sea-surface temperature and how it affects

our weather, seasons, and extreme events such as hurricanes. There is also a crucial need to systematically provide continuous, three-dimensional data for the ocean's heat content, salinity, and currents.

## What will we do?



Advanced ocean observations will help us to understand possible changes in circulation, which could influence weather patterns and climate.

The funding will be used to extend NOAA's existing efforts in this field. In FY03 NOAA proposes that the U.S. build and deploy up to 1/2 (1500) of the Argo float array; previous plans called for a U.S. contribution of up to 1/3 (1000) of the array. With the funding requested, the U.S. could deploy 1500 floats by the end of 2005 and would maintain the array at that level on an ongoing basis. The resulting data streams are designed to provide ocean observations for the Global Ocean Data Assimilation Experiment (GODAE). GODAE is designed to support operational oceanography, seasonal-to-decadal climate forecasts and analyses, and oceanographic research as well as real-time marine weather and ocean forecasting. By the U.S. providing 1/2 of the total array, it will be possible for the international community to attain a complete array earlier than expected. This will provide the critical information needed to address climate uncertainties sooner.

NOAA will also establish ocean station time series at key locations to monitor long-term changes in the ocean and atmosphere. NOAA will also begin monitoring critical locations in the ocean for indications of possible abrupt climate change with the deployment of moored buoys.

This is truly an international effort. NOAA is actively engaged with multiple partners in this activity. For example, ten nations plus the European Union are providing Argo floats at this time. NOAA will work with the Global Climate Observing System (GCOS) and Global Ocean Observing System (GOOS) programs to implement the new aspects under the Administration's proposed Climate Change Research Initiative.

## What are the benefits?

NOAA requests these funds to advance sustained efforts towards the establishment of an ocean observing system that can accurately document climate-scale changes in ocean heat, carbon, and sea level. Reducing uncertainty and providing better tools for policy development and management begins with accurate documentation of current conditions. The ocean observing system will provide the U.S. and its international partners with critical information on the role of the ocean in climate variability and change. The ocean data will be used to develop and test comprehensive climate models for prediction of climate variability from seasons to decades. Other products that would be derived from this effort include new datasets, climatologies, and atlases which can be used to reduce uncertainty and for management of fisheries, coastal regions, and marine resources.



Ocean observation research featured in the popular Mark Trail cartoon strip in 2000



For more information:

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### NOAA Budget

Climate Research  
Climate Observations and Services  
Climate Change Research Initiative

FY2003 Change  
\$ millions

\$18